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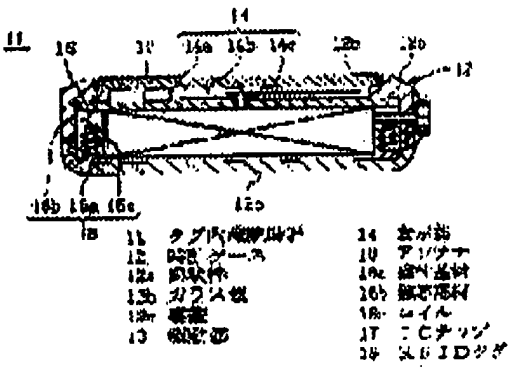
(54) WRISTWATCH WITH BUILT-IN TAG

(57)Abstract:

PROBLEM TO BE SOLVED: To build in an RFID tag having relatively high sensitivity while keeping a high-grade feel.

SOLUTION: This wristwatch with a built-in tag is provided with; a watch case 12 having an annular frame 12a, a glass lid 12b and a back lid 12c; a drive part 13 housed in the watch case; an indication part 14 driven by the drive part for indicating a time; and the RFID tag 18 housed in the watch case and composed of an antenna 16 and an IC chip 17. The antenna 16 is provided with a magnetic base material 16a formed along the inside surface of the back lid, a pair of magnetic core members 16b erected on the magnetic base material so as to catch the drive part, and a series of coils 16c spirally wound around the pair of the magnetic core members. The magnetic base material may be formed in a ring-like shape insertable between the annular frame and the drive part, or in a circular arc-like shape along the inside surface of the annular frame. The magnetic base



material and the pair of the magnetic core members are formed by injection-molding or compression-molding a composite material and preferably formed so as to have flexibility.

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CLAIMS

[Claim(s)]
[Claim 1] The clock housing which has the glass lid (12b) which closes the side front of an annular frame (12a) and this annular frame (12a), and the back lid (12c) which closes the background of this annular frame (12a) (12), The actuator (13) held in said clock housing (12), and the display which is held in said clock housing (12), drives by said actuator (13), and displays time of day (14), In the wrist watch with which the tag equipped with the RF-ID tag (18) which was held in said clock housing (12) and constituted with an antenna (16) and IC chip (17) was built in The magnetic base material with which said antenna (16) was formed in accordance with said back lid (12c) inner surface (16a), The wrist watch with which the tag characterized by having a series of coils (16c) spirally wound around the magnetic core member (16b, 16b) of the couple set up by said magnetic base material (16a) so that it might face across said actuator (13), and the magnetic core member (16b, 16b) of said couple was built in.
[Claim 2] The wrist watch according to claim 1 formed in the shape of [which a magnetic base material (16a) can insert between an annular frame (12a) and an actuator (13)] a ring.
[Claim 3] The wrist watch according to claim 1 formed in the shape of [to which a magnetic base material (16a) is between an annular frame (12a) and an actuator (13), and meets the inner surface of said annular frame (12a)] radii.
[Claim 4] The wrist watch according to claim 2 or 3 constituted with the composite with which either or the both sides of a magnetic base material (16a) and the magnetic core member (16b, 16b) of a couple comes to mix the powder or the flake, plastics, or rubber of a soft magnetism ferrite or a soft magnetism metal.
[Claim 5] The wrist watch according to claim 4 with which composite was constituted in the powder or flake of a soft magnetism ferrite or a soft magnetism metal so that it might have a under 70 volume % implication and flexibility more than 10 volume %.
[Claim 6] The wrist watch according to claim 4 or 5 in which the both sides of a magnetic base material (16a) and the magnetic core member (16b, 16b) of a couple were formed in one with said composite by injection molding or pressing composite.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the wrist watch having the tag which used the RFID (radio-frequency discernment: Radio Frequency Identification) technique.
[0002]
[Description of the Prior Art] Conventionally, as what checks a man or an article visually, although there are plates, such as an identification tag and a label, the information which can be displayed on this plate can display only the information on the amount restricted extremely. For this reason, the tag which added the discernment function electronically using the RFID (radio-frequency discernment: Radio FrequencyIdentification) technique is known for recent years. In addition to the ability to check visually the information stamped on the surface of the plate, various information can be stored in the above-mentioned IC chip, if this tag for discernment has the antenna electrically connected to IC chip and this IC chip and attaches this tag for discernment to the above-mentioned plate. For example, anchoring and the information automatically memorized by IC chip can be taken out for the above-mentioned plate with a tag on a man or articles, and in-and-out management or accounts management of a man or an article can be performed now.
[0003] In addition, recently, using such a tag for discernment as the ticket and commuter pass of an electric car or a bus as an identification unit for entrance at the gate in the lift bus stop of a skiing area or the gate in the play facilities of various amusement parks is made. If the tag for discernment is used for passage of such the gate or the discernment for entrainment, the PAX who is going to ride on a lift, the PAX who is going to get into [play equipment], or the PAX who is going to get on can identify that he is the PAX of normal in the easy actuation for bringing the tag close to a discernment means by which it was prepared at the gate. The PAX who gets into [the PAX who rides on a lift or play equipment, a bus, etc.] on the other hand is wearing the wrist watch which usually displays time of day on the arm. For this reason, the attempt which is going to build the tag for discernment in that wrist watch is made. If this tag for discernment can be built in a wrist watch, since it is not necessary to carry the separate independent tag for discernment apart from a wrist watch and the tag for discernment can be worn on an arm without sense of incongruity, it is expected that that field of the invention will be expanded also compared with the former.
[0004] It has the clock housing 2 with which a wrist watch common here has glass lid 2b which closes the side front of annular frame 2a and this annular frame 2a as shown in drawing 7 , and back lid 2c which closes the background of this annular frame 2a, the actuator 3 held in that clock housing 2, and the display 4 which is held in clock housing 2, drives by the actuator 3, and displays time of day. With this wrist watch 1, structure which holds a display 4 and an actuator 3 in the interior of annular frame 2a closed with glass lid 2b in the side front in this sequence, and finally closes the background of annular frame 2a with a back lid is made. Therefore, winding a coil and considering as the antenna of an RF-ID tag so that an actuator 3 may be surrounded along the perimeter of the actuator 3 which faces building the tag for discernment in the conventional wrist watch 1, and has allowances in space comparatively,

i.e., the inner surface of annular frame 2a, is performed. It is expected that the antenna which consists of such a coil will have a magnetization shaft vertical to a dial face, the sensibility of the RF-ID tag at the time of holding up a wrist watch to an identification unit with a magnetization shaft vertical to the dial face which has the biggest area will be raised, and the working distance will be lengthened.

[0005]

[Problem(s) to be Solved by the Invention] However, in order that a common wrist watch may brew endurance and a high-class feeling, the annular frame which constitutes the clock housing is made with the metal which has electric conductivity. For this reason, when a coil is wound along with this frame part material and an antenna is held in a wrist watch, there is nonconformity against which the induced current flows an electric wave also to that frame part material in the carrier beam case, and an antenna sets off the electric wave from the outside. Moreover, also when a current flows in the coil which constitutes an antenna, there is also nonconformity which a current flows [nonconformity] to metal frame part material, and reduces the sensibility of an antenna to it remarkably, and there is a trouble of shortening the working distance of an RF-ID tag remarkably. In order to cancel this point, forming the frame part material in the clock housing of a wrist watch with non-conductive resin is also considered, but when frame part material is formed with resin, there is nonconformity to which a wrist watch cannot express the high-class feeling which it has essentially, but that endurance is also inferior in it. The object of this invention is to offer the wrist watch with a built-in tag which contains an RF-ID tag in the condition that sensibility is comparatively high, without spoiling endurance and a high-class feeling.

[0006]

[Means for Solving the Problem] The clock housing 12 with which invention concerning claim 1 has glass lid 12b which closes the side front of annular frame 12a and this annular frame 12a, and back lid 12c which closes the background of this annular frame 12a as shown in drawing 1 , The actuator 13 held in clock housing 12, and the display 14 which is held in clock housing 12, drives by the actuator 13, and displays time of day, It is amelioration of the wrist watch with which the tag equipped with RF-ID tag 18 which was held in clock housing 12 and constituted with an antenna 16 and the IC chip 17 was built in. The characteristic configuration has an antenna 16 in the place equipped with a series of coil 16c spirally wound around magnetic base material 16a prepared in accordance with the back lid 12c inner surface, the magnetic core members 16b and 16b of the couple set up by magnetic base material 16a so that it might face across an actuator 13, and the magnetic core members 16b and 16b of a couple.

[0007] With the wrist watch with a built-in tag indicated by this claim 1, the magnetic flux in an antenna 16 draws a loop formation which invades from one magnetic core member 16b, passes magnetic base material 16a, and comes out of magnetic core member 16b of another side, as the continuous-line arrow head of drawing 2 shows. For this reason, the directions of a current which flow near the annular frame 12a in a series of coil 16c wound around the magnetic core members 16b and 16b of a couple differ mutually, the induced current generated by coil 16c in one magnetic core member 16b is negated according to the induced current generated by coil 16c in magnetic core member 16b of another side, and the induced current does not flow to annular frame 12a substantially. Moreover, since magnetic base material 16a is prepared in accordance with a back lid 12c inner surface, even if the magnetization shaft in the magnetic base material 16a becomes back lid 12c and parallel and back lid 12c is formed with the metal, it can prevent that the sensibility of the antenna 16 resulting from an eddy current not flowing to the back lid 12c, and the induced current and an eddy current flowing falls.

[0008] Invention concerning claim 2 is invention concerning claim 1, and is the wrist watch with a built-in tag with which magnetic base material 16a was formed in the shape of [which can be inserted between annular frame 12a and an actuator 13] a ring. Even if it is the case where there is no clearance between an actuator 13 and back lid 12c, RF-ID tag 18 can be made to build in clock housing 12 by obtaining magnetic base material 16a which suited the space configuration between annular frame 12a and an actuator 13 with the wrist watch with a built-in tag indicated by this claim 2, using effectively the space between annular frame 12a and an actuator 13.

[0009] Invention concerning claim 3 is invention concerning claim 1, and magnetic base material 16a is between annular frame 12a and an actuator 13, and it is the wrist watch with a built-in tag formed in the

shape of [in alignment with the inner surface of annular frame 12a] radii. With the wrist watch with a built-in tag indicated by this claim 3 Even if it is the case where there is no clearance between an actuator 13 and back lid 12c, and ring-like space does not exist between annular frame 12a and an actuator 13 RF-ID tag 18 can be made to build in clock housing 12 by obtaining magnetic base material 16a which suited the space configuration of the shape of radii between annular frame 12a and an actuator 13, using the space of the shape of the radii effectively.

[0010] Invention concerning claim 4 is invention concerning claim 2 or 3, and is the wrist watch with a built-in tag constituted with the composite with which either or the both sides of magnetic base material 16a and the magnetic core members 16b and 16b of a couple comes to mix the powder or the flake, plastics, or rubber of a soft magnetism ferrite or a soft magnetism metal. With the wrist watch with a built-in tag indicated by this claim 4, it becomes possible by using composite to obtain the high antenna 16 of a mechanical strength as compared with the magnetic core member which consists of a ferrite sintered compact known from the former in a comparatively high frequency.

[0011] Invention concerning claim 5 is invention concerning claim 4, and is the wrist watch with a built-in tag with which composite was constituted in the powder or flake of a soft magnetism ferrite or a soft magnetism metal so that it might have a under 70 volume % implication and flexibility more than 10 volume %. With the wrist watch with a built-in tag indicated by this claim 5, that space can be effectively used by becoming possible to give flexibility and making the space configuration between annular frame 12a and an actuator 13 suit and deform magnetic base material 16a and the magnetic core members 16b and 16b of a couple into magnetic base material 16a which consists of composite, and the magnetic core members 16b and 16b of a couple.

[0012] Invention concerning claim 6 is invention concerning claim 4 or 5, and is the wrist watch with a built-in tag in which the both sides of magnetic base material 16a and the magnetic core members 16b and 16b of a couple were formed in one with composite by injection molding or pressing composite. With the wrist watch with a built-in tag indicated by this claim 6, it becomes possible to fit the configuration of magnetic base material 16a which consists of composite, and the magnetic core members 16b and 16b of a couple to the space configuration between annular frame 12a and an actuator 13, and to form it, and that space can be used still more effectively.

[0013]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained based on a drawing. As shown in drawing 1 and drawing 3 , a wrist watch 11 is equipped with RF-ID tag 18 (drawing 1 and drawing 2) constituted with clock housing 12, the actuator 13 held in the case 12, the display 14 which drives by the actuator 13 and displays time of day, and an antenna 16 and the IC chip 17. A case 12 is constituted by annular frame 12a, glass lid 12b, and back lid 12c. Annular frame 12a is formed in the shape of a circular ring with a metal, glass lid 12b is formed in disc-like with an electrical insulation material (glass plate), and back lid 12c is formed in disc-like with electrical insulation materials (plastics etc.). Moreover, a display 14 consists of clock short hand 14b which drives by dial-face 14a and the actuator 13, and rotates a dial-face 14a top, clock long hand 14c, and a second pointer (not shown), an actuator 13 rotates a dial-face 14a top for these clock short hand 14b, clock long hand 14c, and a second pointer, and it is constituted so that time of day may be displayed.

[0014] An antenna 16 is equipped with magnetic base material 16a prepared in accordance with the back lid 12c inner surface between annular frame 12a and an actuator 13, the magnetic core members 16b and 16b of the shape of a pin of the couple set up by this magnetic base material, and coil 16c spirally wound around these magnetic core members 16b and 16b as shown in drawing 1 and drawing 2 . Magnetic base material 16a in the gestalt of this operation is formed in the shape of [which can be inserted between annular frame 12a and an actuator 13] a ring, and the magnetic core members 16b and 16b are set up by the position of symmetry of that magnetic base material 16a, respectively. [whether magnetic base material 16a and the magnetic core members 16b and 16b are formed with a metal, the powder of a ferrite, or the composite of a flake and plastics, and] Or Fe system Alike in accordance with the inner surface of amorphous foil or annular frame 12a which has the flexibility which can be attached to the inner surface of annular frame 12a, such as Co system (METGLAS2714A by the ARAIDO

chemical company), (METGLAS2605S-2 by the ARAIDO chemical company) the amorphous foil possible [an attachment] It can form with the plywood which carried out the laminating.
[0015] The ferrite or metal in the above-mentioned composite is a soft magnetism ferrite or a soft magnetism metal, can use thermoplastic plastics with the sufficient workability as plastics, or can use thermosetting heat-resistant good plastics. Moreover, as powder of the above-mentioned metal, atomization powder, such as a carbonyl-iron-powder and iron-permalloy, reduced iron powder, etc. are used. On the other hand, after making the above-mentioned powder detailed with a ball mill etc. and fabricating powder as a metaled flake, the flake which flattened this powder mechanically and was obtained, and the flake which the molten metal grain of an iron system or a cobalt system amorphous alloy was made to collide with water-cooled copper, and was obtained are used.
[0016] As for magnetic base material 16a formed with composite, it is desirable to form in the flexible member which can be attached in accordance with the inner surface of annular frame 12a. For this reason, as for the powder or flake of a ferrite or a metal, it is desirable to use the composite contained in the range below 70 volume % more than 10 volume %. It becomes impossible for the permeability of magnetic base material 16a obtained as the powder or flake of a ferrite or a metal is less than ten volume to become low, and to make large-sized the magnetic base material 16a itself, for obtaining required permeability, and to attain the miniaturization of antenna 16 the very thing. There is a possibility that magnetic base material 16a obtained on the other hand when the powder or flake of a ferrite or a metal exceeded 70 volume % may stop having flexibility, and there is a possibility that it may become difficult to make the magnetic base material 16a transform in accordance with the inner surface of annular frame 12a. In addition, the powder of a ferrite or a metal or especially the desirable range of a flake is 25 volume % - 56 volume %.
[0017] When forming magnetic base material 16a and the magnetic core members 16b and 16b with composite, it is desirable to injection mold or press composite. Since magnetic core base material 16a and the magnetic core members 16b and 16b which were formed with composite have flexibility, even if it makes them thin as compared with what was formed of the brittle ferrite, they cannot break easily. Moreover, the powder or flake of a ferrite or a metal is distributed by plastics, namely, since magnetic powder or a flake is mutually insulated by plastics, magnetic base material 16a and the magnetic core members 16b and 16b do not generate an eddy current, even if it does not have conductivity as a whole and receives the electric wave of a RF.
[0018] An antenna 16 has a series of coil 16c around which the axis of each magnetic core member 16b and 16b was spirally wound as a core by the magnetic core members 16b and 16b of a couple mentioned above, and coil 16c in the gestalt of this operation is made by winding coat copper wire. When the coat copper wire is made to energize coat copper wire, it is wound so that the magnetic flux produced in the magnetic core members 16b and 16b of a couple may be open for free passage through magnetic base material 16a, RF-ID tag 18 is made by connecting the IC chip 17 to coil 16c which wound coat copper wire and was obtained electrically, and the IC chip 17 is carried on magnetic base material 16a. Thus, it is in the condition which the magnetic core members 16b and 16b of a couple are the perimeters of an actuator 13, the made tag 18 was held in clock housing 12 so that it might have an axis vertical to a glass lid in the location which faces across the actuator 13, and was held in clock housing, and magnetic base material 16a is prepared in accordance with the back lid 12c inner surface between annular frame 12a and an actuator 13. In addition, the signs 12d and 12d of drawing 3 are the receptacle implements of the couple which protruded on annular frame 12a, and the ends of a band 19 are pivoted by these receptacle implements 12d and 12d, respectively.
[0019] As shown in drawing 4 , the IC chip 17 has power circuit 17a, (radio frequency RF) circuit 17b, modulation circuit 17c, 17d of demodulator circuits and CPU17e, and memory 17f that is connected to this CPU17e and memorizes the information about the owner of a wrist watch. Power circuit 17a builds in a capacitor (not shown), and this capacitor forms a resonance circuit with an antenna 16. When an antenna 16 receives the electric wave (frequency in which the above-mentioned resonance circuit resonates) of a specific frequency to this capacitor, the power produced in that mutual induction effect is charged. Power circuit 17a rectifies and stabilizes this power, supplies it to CPU17e, and activates the IC

chip 17. Memory 17f, while performing read-out of the data memorized according to the read-out command by the data communication of the electric wave from a discernment means 26 to mention later under control of CPU17e including ROM (read only memory), RAM (ramdom-access memory), and EEPROM (electrically erasable pogramable read only memory), the writing of data is performed according to the write-in command from the discernment means 26.

[0020] A discernment means 26 to, read the information memorized by the IC chip 17 on the other hand is equipped with the processing section 28 which is made to send an electric wave from the transceiver antenna 27 which carries out a mutual induction effect to an antenna 16, and the transceiver antenna 27, and processes the carrier beam electric wave of the transceiver antenna 27, and the display 29 which displays the information memorized by the IC chip 17. A receiving antenna 27 transmits an electric wave to the antenna 16 of RF-ID tag 18 built in the wrist watch 11, and ability ready for receiving constitutes the electric wave from the antenna 16. Moreover, the processing section 28 has memory 28f which memorizes the information which connected with the transceiver antenna 27, connected with power circuit 28a which builds in a dc-battery, (radio frequency RF) circuit 28b, modulation circuit 28c, 28d of demodulator circuits and CPU28e, and this CPU28e, and was read in the IC chip 17. Moreover, 28g of input sections is connected to CPU28e of the processing section 28, and the information inputted by 28g of this input section is constituted by the IC chip 17 possible [writing].

[0021] Thus, the operation of the wrist watch having the tag for discernment is explained. Before wearing a wrist watch 11 first, the information on the proper of those who wear a wrist watch 11 from 28g of input sections of the discernment means 26 is inputted, and the information on the proper about those who wear this wrist watch 11 to memory 17f of the IC chip 17 is made to memorize. With the gestalt of this operation, the information about the ticket of an electric car shall be inputted and the information about the entrainment opening day, the end date, and the entrainment section when the concrete content of an input permits the entrainment to an electric car is memorized by memory 17f. After inputting information, a possessor's arm is equipped with the wrist watch 11 through belts 12 and 12. In this case, with the wrist watch 11 with a built-in tag of this invention, since annular frame 12a expressed around glass lid 12b is formed with a metallic material when an arm is equipped, the endurance which can express the high-class feeling which that wrist watch 11 has essentially, and clock housing 12 has essentially is securable.

[0022] On the other hand, the discernment means 26 is formed in the gate in the door of a station, and when those who wore the wrist watch 11 pass through the gate, the wrist watch 11 is brought close to the transceiver antenna 27 in the discernment means 26 formed in the gate. The discernment means 26 transmits the question signal of the digital signal made binary towards the antenna 16 of RF-ID tag 18 from the transceiver antenna 27 by the electric wave of a specific frequency. The electric wave transmitted from the transceiver antenna 27 passes glass lid 12b, and is received by the antenna 16. Since it is wound here so that the magnetic flux produced in the magnetic core members 16b and 16b of a couple may be open for free passage through magnetic base material 16a when the coat copper wire is made to energize the coat copper wire which constitutes coil 16c, the magnetic flux in an antenna 16 draws a loop formation which invades from one magnetic core member 16b, passes magnetic base material 16a, and comes out of magnetic core member 16b of another side, as the continuous-line arrow head of drawing 2 shows.

[0023] For this reason, the directions of a current which flow near the annular frame 12a in a series of coil 16c wound around the magnetic core members 16b and 16b of a couple differ mutually, the induced current generated by coil 16c in one magnetic core member 16b is negated according to the induced current generated by coil 16c in magnetic core member 16b of another side, and the induced current does not flow to annular frame 12a substantially. Moreover, since magnetic base material 16a is prepared in accordance with a back lid 12c inner surface, even if the magnetization shaft in the magnetic base material 16a becomes back lid 12c and parallel and back lid 12c is formed with the metal, it can prevent that the sensibility of the antenna 16 resulting from an eddy current not flowing to the back lid 12c, and the induced current and an eddy current flowing falls. Furthermore, by having the magnetic core members 16b and 16b, the receiving sensibility of antenna 16 the very thing improves, and the

antenna 16 receives effectively the electric wave emitted from the transceiver antenna 27.
[0024] Power will be charged by the capacitor of power circuit 17a if the antenna 16 in RF-ID tag 18 receives an electric wave. Power circuit 17a supplies power to CPU17e, activates the IC chip 17, and makes the question signal of the original digital signal reproduce through RF circuit 17b at 17d of demodulator circuits. CPU17e transmits the information about that wrist watch 11 memorized by memory 17f based on this question signal. Transmission of this information modulates the data signal made binary by modulation circuit 17c of the IC chip 17, and is performed by amplifying by RF circuit 17b and sending out from an antenna 16. The transceiver antenna 27 of the discernment means 26 receives the transmitted data, and the processing section 28 is opened so that those who opened the door prepared in the gate and wore the wrist watch 11 can take an electric car, while it displays the information on the proper of those who wore the wrist watch from RF-ID tag 18 on a display 29.
[0025] In addition, although the gestalt of operation mentioned above explained the clock housing 12 which has back lid 12c formed in disc-like with electrical insulation materials (plastics etc.), the back lid 12c may be formed with a metal. Even if back lid 12c is formed with a metal, it can prevent that the sensibility of the antenna 16 resulting from the magnetization shaft in magnetic base material 16a becoming back lid 12c and parallel, an eddy current not flowing to the back lid 12c, and an eddy current flowing falls. Moreover, although the gestalt of operation mentioned above explained magnetic base material 16a formed in the shape of [which can be inserted between annular frame 12a and an actuator 13] a ring, as long as a clearance is between an actuator 13 and back lid 12c and it can hold in the clearance, as shown in drawing 5 , magnetic base material 16a may be plate-like. Furthermore, even if it is the case where there is such no clearance, as long as it is able for the magnetic flux which invaded from one magnetic core member 16b to pass magnetic base material 16a, and to come out of magnetic core member 16b of another side, as shown in drawing 6 , magnetic base material 16a may be formed in the shape of [which is between annular frame 12a and an actuator 13, and meets the inner surface of annular frame 12a] radii.
[0026]
[Example] Next, the example of this invention is explained in detail with the example of a comparison. The clock housing 12 which has annular frame 12a whose thickness which consists of <example 1 of comparison> stainless steel, and has the bore whose bore is 28mm is 3mm, glass lid 12b which closes the side front of this annular frame 12a, and back lid 12c which consisted of polycarbonate resin which closes the background of this annular frame 12a was prepared, and the actuator 13 of a disk type whose outer diameter is 20mm was held in this clock housing 12. The antenna which, on the other hand, winds the coat copper wire whose size is 0.08mm 5 times so that an actuator 13 may be surrounded in accordance with the inner surface of annular frame 12a, and consists only of a coil was created. This antenna was held in clock housing and the wrist watch with a built-in tag was obtained. This wrist watch was made into the example 1 of a comparison.
[0027] The same clock housing 12 as the example 1 of a <example 1> comparison was prepared, and the actuator 13 of the example 1 of a comparison and isomorphous ** size was held in this clock housing 12. On the other hand, the composite which comes to mix the powder of the soft magnetism metal of 56 volume % and the plastics of 44 volume % was injection molded, and the magnetic core members 16b and 16b of magnetic base material 16a and a couple were formed in one. Magnetic base material 16a was formed in the shape of [whose a bore is 21mm / whose an outer diameter is 27mm] a ring, and the magnetic base material 16a was made to set up the magnetic core members 16b and 16b of a couple so that it may face across an actuator 13. And the size formed coil 16c which wound around the magnetic core members 16b and 16b of a couple spirally the coat copper wire which is 0.08mm 20 times, respectively, and was wound 40 times on the both sides of the magnetic core members 16b and 16b of a couple, and created the antenna 16. It held in clock housing 12 and the wrist watch 11 with a built-in tag was obtained so that magnetic base material 16a in this antenna might meet a back lid 12c inner surface. This wrist watch was made into the example 1.
[0028] <Comparative study> The terminal for measurement of the measuring instrument (product made from HEWLETT PACKARD 4395) which measures a coil property was connected to the coil of the

antenna in the example 1 of a comparison and example 1 which were mentioned above, and Q value was measured in L value list of an antenna to the frequency of 13.56MHz with the measuring instrument, respectively. Moreover, after considering as the RF-ID tag which connects IC chip to the coil of the antenna of the example 1 of a comparison, and an example 1, respectively, and operates by 13.56MHz, the tag was held in the cell case. This wrist watch with a built-in tag was brought close to the transceiver antenna of a discernment means to operate by 13.56MHz, the existence of actuation of that discernment means was checked, and when it operated, the distance between the transceiver antenna which operated first, and a wrist watch with a built-in tag was measured. These results are shown in a table 1, respectively.

[0029]

[A table 1]

	実施例1	比較例1
磁芯部材	有り	なし
L (μH)	1.205	1.115
Q	31.6	92.3
動作の有無	12mmの距離で作動	非作動

[0030] In an example 1 and the example 1 of a comparison, it is not thought that there is a difference with remarkable L value so that clearly from a table 1. Moreover, although the Q value of the example 1 of a comparison was clearly large as compared with the Q value of an example 1, even if it connected IC chip to the coil of the antenna of the example 1 of a comparison, a discernment means did not operate. On the other hand, although the Q value of an example 1 was small as compared with the Q value of the example 1 of a comparison, as for what connected IC chip to the coil of the antenna of an example 1, the discernment means operated. Since the electric wave was offset by the induced current to which an antenna flows an electric wave to frame part material in the carrier beam case, not operating in the example 1 of a comparison is thought of. It is thought that having operated in the example 1 is based on the result by which offset of the electric wave resulting from the induced current flowing was controlled on the other hand since a series of coil 16c was wound around the magnetic core members 16b and 16b of the couple set up by magnetic base material 16a.

[0031]

[Effect of the Invention] Since the antenna was equipped with a series of coils spirally wound around the magnetic base material formed in accordance with the back lid inner surface, the magnetic core member of the couple set up by the magnetic base material so that it might face across an actuator, and the magnetic core member of a couple according to this invention as stated above, it can prevent that the induced current flows in an annular frame. Moreover, since a magnetic base material is formed in accordance with a back lid inner surface, even if the magnetization shaft in a magnetic base material becomes a back lid and parallel and the back lid is formed with the metal, it can prevent that the sensibility of the antenna resulting from an eddy current not flowing on the back lid, and the induced current and an eddy current flowing falls. Consequently, even if it builds an RF-ID tag in the metal casing which does not spoil endurance and a high-class feeling and has that annular frame by forming an annular frame with a metal, it can prevent that the sensibility of the antenna resulting from the induced current flowing falls, and that RF-ID tag can be made to build in in the condition that sensibility is comparatively high.

[0032] Moreover, if a magnetic base material is formed in the shape of [which can be inserted between an annular frame and an actuator] a ring If an RF-ID tag can be made to build in clock housing and a magnetic base material is formed in the shape of [which is between an annular frame and an actuator and meets the inner surface of an annular frame] radii even if it is the case where there is no clearance between an actuator and a back lid Even if it is the case where ring-like space does not exist between an

annular frame and an actuator, an RF-ID tag can be made to build in clock housing. Furthermore, if it will become possible to obtain an antenna with a comparatively high mechanical strength if a magnetic base material and the magnetic core member of a couple are formed with composite, and flexibility is given to them, the space can be effectively used by making a magnetic base material and the magnetic core member of a couple suit and deform into the space configuration between an annular frame and an actuator. If it forms by injection molding or pressing composite especially, it will become possible to make the space configuration between an annular frame and an actuator suit from the beginning, and to form a magnetic base material and a magnetic core member, and it will become possible to use the space still more effectively.

[Translation done.]

JP,2002-341059,A [TECHNICAL FIELD]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the wrist watch having the tag which used the RFID (radio-frequency discernment: Radio Frequency Identification) technique.

[Translation done.]

JP,2002-341059,A [PRIOR ART]

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PRIOR ART

[Description of the Prior Art] Conventionally, as what checks a man or an article visually, although there are plates, such as an identification tag and a label, the information which can be displayed on this plate can display only the information on the amount restricted extremely. For this reason, the tag which added the discernment function electronically using the RFID (radio-frequency discernment: Radio FrequencyIdentification) technique is known for recent years. In addition to the ability to check visually the information stamped on the surface of the plate, various information can be stored in the above-mentioned IC chip, if this tag for discernment has the antenna electrically connected to IC chip and this IC chip and attaches this tag for discernment to the above-mentioned plate. For example, anchoring and the information automatically memorized by IC chip can be taken out for the above-mentioned plate with a tag on a man or articles, and in-and-out management or accounts management of a man or an article can be performed now.

[0003] In addition, recently, using such a tag for discernment as the ticket and commuter pass of an electric car or a bus as an identification unit for entrance at the gate in the lift bus stop of a skiing area or the gate in the play facilities of various amusement parks is made. If the tag for discernment is used for passage of such the gate or the discernment for entrainment, the PAX who is going to ride on a lift, the PAX who is going to get into [play equipment], or the PAX who is going to get on can identify that he is the PAX of normal in the easy actuation for bringing the tag close to a discernment means by which it was prepared at the gate. The PAX who gets into [the PAX who rides on a lift or play equipment, a bus, etc.] on the other hand is wearing the wrist watch which usually displays time of day on the arm. For this reason, the attempt which is going to build the tag for discernment in that wrist watch is made. If this tag for discernment can be built in a wrist watch, since it is not necessary to carry the separate independent tag for discernment apart from a wrist watch and the tag for discernment can be worn on an arm without sense of incongruity, it is expected that that field of the invention will be expanded also compared with the former.

[0004] It has the clock housing 2 with which a wrist watch common here has glass lid 2b which closes the side front of annular frame 2a and this annular frame 2a as shown in drawing 7 , and back lid 2c which closes the background of this annular frame 2a, the actuator 3 held in that clock housing 2, and the display 4 which is held in clock housing 2, drives by the actuator 3, and displays time of day. With this wrist watch 1, structure which holds a display 4 and an actuator 3 in the interior of annular frame 2a closed with glass lid 2b in the side front in this sequence, and finally closes the background of annular frame 2a with a back lid is made. Therefore, winding a coil and considering as the antenna of an RF-ID tag so that an actuator 3 may be surrounded along the perimeter of the actuator 3 which faces building the tag for discernment in the conventional wrist watch 1, and has allowances in space comparatively, i.e., the inner surface of annular frame 2a, is performed. It is expected that the antenna which consists of such a coil will have a magnetization shaft vertical to a dial face, the sensibility of the RF-ID tag at the time of holding up a wrist watch to an identification unit with a magnetization shaft vertical to the dial face which has the biggest area will be raised, and the working distance will be lengthened.

JP,2002-341059,A [PRIOR ART]

[Translation done.]

JP,2002-341059,A [EFFECT OF THE INVENTION]

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the antenna was equipped with a series of coils spirally wound around the magnetic base material formed in accordance with the back lid inner surface, the magnetic core member of the couple set up by the magnetic base material so that it might face across an actuator, and the magnetic core member of a couple according to this invention as stated above, it can prevent that the induced current flows in an annular frame. Moreover, since a magnetic base material is formed in accordance with a back lid inner surface, even if the magnetization shaft in a magnetic base material becomes a back lid and parallel and the back lid is formed with the metal, it can prevent that the sensibility of the antenna resulting from an eddy current not flowing on the back lid, and the induced current and an eddy current flowing falls. Consequently, even if it builds an RF-ID tag in the metal casing which does not spoil endurance and a high-class feeling and has that annular frame by forming an annular frame with a metal, it can prevent that the sensibility of the antenna resulting from the induced current flowing falls, and that RF-ID tag can be made to build in in the condition that sensibility is comparatively high.
[0032] Moreover, if a magnetic base material is formed in the shape of [which can be inserted between an annular frame and an actuator] a ring If an RF-ID tag can be made to build in clock housing and a magnetic base material is formed in the shape of [which is between an annular frame and an actuator and meets the inner surface of an annular frame] radii even if it is the case where there is no clearance between an actuator and a back lid Even if it is the case where ring-like space does not exist between an annular frame and an actuator, an RF-ID tag can be made to build in clock housing. Furthermore, if it will become possible to obtain an antenna with a comparatively high mechanical strength if a magnetic base material and the magnetic core member of a couple are formed with composite, and flexibility is given to them, the space can be effectively used by making a magnetic base material and the magnetic core member of a couple suit and deform into the space configuration between an annular frame and an actuator. If it forms by injection molding or pressing composite especially, it will become possible to make the space configuration between an annular frame and an actuator suit from the beginning, and to form a magnetic base material and a magnetic core member, and it will become possible to use the space still more effectively.

[Translation done.]

JP,2002-341059,A [TECHNICAL PROBLEM]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in order that a common wrist watch may brew endurance and a high-class feeling, the annular frame which constitutes the clock housing is made with the metal which has electric conductivity. For this reason, when a coil is wound along with this frame part material and an antenna is held in a wrist watch, there is nonconformity against which the induced current flows an electric wave also to that frame part material in the carrier beam case, and an antenna sets off the electric wave from the outside. Moreover, also when a current flows in the coil which constitutes an antenna, there is also nonconformity which a current flows [nonconformity] to metal frame part material, and reduces the sensibility of an antenna to it remarkably, and there is a trouble of shortening the working distance of an RF-ID tag remarkably. In order to cancel this point, forming the frame part material in the clock housing of a wrist watch with non-conductive resin is also considered, but when frame part material is formed with resin, there is nonconformity to which a wrist watch cannot express the high-class feeling which it has essentially, but that endurance is also inferior in it. The object of this invention is to offer the wrist watch with a built-in tag which contains an RF-ID tag in the condition that sensibility is comparatively high, without spoiling endurance and a high-class feeling.

[Translation done.]

JP,2002-341059,A [MEANS]

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MEANS

[Means for Solving the Problem] The clock housing 12 with which invention concerning claim 1 has glass lid 12b which closes the side front of annular frame 12a and this annular frame 12a, and back lid 12c which closes the background of this annular frame 12a as shown in drawing 1 , The actuator 13 held in clock housing 12, and the display 14 which is held in clock housing 12, drives by the actuator 13, and displays time of day, It is amelioration of the wrist watch with which the tag equipped with RF-ID tag 18 which was held in clock housing 12 and constituted with an antenna 16 and the IC chip 17 was built in. The characteristic configuration has an antenna 16 in the place equipped with a series of coil 16c spirally wound around magnetic base material 16a prepared in accordance with the back lid 12c inner surface, the magnetic core members 16b and 16b of the couple set up by magnetic base material 16a so that it might face across an actuator 13, and the magnetic core members 16b and 16b of a couple.
[0007] With the wrist watch with a built-in tag indicated by this claim 1, the magnetic flux in an antenna 16 draws a loop formation which invades from one magnetic core member 16b, passes magnetic base material 16a, and comes out of magnetic core member 16b of another side, as the continuous-line arrow head of drawing 2 shows. For this reason, the directions of a current which flow near the annular frame 12a in a series of coil 16c wound around the magnetic core members 16b and 16b of a couple differ mutually, the induced current generated by coil 16c in one magnetic core member 16b is negated according to the induced current generated by coil 16c in magnetic core member 16b of another side, and the induced current does not flow to annular frame 12a substantially. Moreover, since magnetic base material 16a is prepared in accordance with a back lid 12c inner surface, even if the magnetization shaft in the magnetic base material 16a becomes back lid 12c and parallel and back lid 12c is formed with the metal, it can prevent that the sensibility of the antenna 16 resulting from an eddy current not flowing to the back lid 12c, and the induced current and an eddy current flowing falls.
[0008] Invention concerning claim 2 is invention concerning claim 1, and is the wrist watch with a built-in tag with which magnetic base material 16a was formed in the shape of [which can be inserted between annular frame 12a and an actuator 13] a ring. Even if it is the case where there is no clearance between an actuator 13 and back lid 12c, RF-ID tag 18 can be made to build in clock housing 12 by obtaining magnetic base material 16a which suited the space configuration between annular frame 12a and an actuator 13 with the wrist watch with a built-in tag indicated by this claim 2, using effectively the space between annular frame 12a and an actuator 13.
[0009] Invention concerning claim 3 is invention concerning claim 1, and magnetic base material 16a is between annular frame 12a and an actuator 13, and it is the wrist watch with a built-in tag formed in the shape of [in alignment with the inner surface of annular frame 12a] radii. With the wrist watch with a built-in tag indicated by this claim 3 Even if it is the case where there is no clearance between an actuator 13 and back lid 12c, and ring-like space does not exist between annular frame 12a and an actuator 13 RF-ID tag 18 can be made to build in clock housing 12 by obtaining magnetic base material 16a which suited the space configuration of the shape of radii between annular frame 12a and an actuator 13, using the space of the shape of the radii effectively.
[0010] Invention concerning claim 4 is invention concerning claim 2 or 3, and is the wrist watch with a

built-in tag constituted with the composite with which either or the both sides of magnetic base material 16a and the magnetic core members 16b and 16b of a couple comes to mix the powder or the flake, plastics, or rubber of a soft magnetism ferrite or a soft magnetism metal. With the wrist watch with a built-in tag indicated by this claim 4, it becomes possible by using composite to obtain the high antenna 16 of a mechanical strength as compared with the magnetic core member which consists of a ferrite sintered compact known from the former in a comparatively high frequency.

[0011] Invention concerning claim 5 is invention concerning claim 4, and is the wrist watch with a built-in tag with which composite was constituted in the powder or flake of a soft magnetism ferrite or a soft magnetism metal so that it might have a under 70 volume % implication and flexibility more than 10 volume %. With the wrist watch with a built-in tag indicated by this claim 5, that space can be effectively used by becoming possible to give flexibility and making the space configuration between annular frame 12a and an actuator 13 suit and deform magnetic base material 16a and the magnetic core members 16b and 16b of a couple into magnetic base material 16a which consists of composite, and the magnetic core members 16b and 16b of a couple.

[0012] Invention concerning claim 6 is invention concerning claim 4 or 5, and is the wrist watch with a built-in tag in which the both sides of magnetic base material 16a and the magnetic core members 16b and 16b of a couple were formed in one with composite by injection molding or pressing composite. With the wrist watch with a built-in tag indicated by this claim 6, it becomes possible to fit the configuration of magnetic base material 16a which consists of composite, and the magnetic core members 16b and 16b of a couple to the space configuration between annular frame 12a and an actuator 13, and to form it, and that space can be used still more effectively.

[0013]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained based on a drawing. As shown in drawing 1 and drawing 3 , a wrist watch 11 is equipped with RF-ID tag 18 (drawing 1 and drawing 2) constituted with clock housing 12, the actuator 13 held in the case 12, the display 14 which drives by the actuator 13 and displays time of day, and an antenna 16 and the IC chip 17. A case 12 is constituted by annular frame 12a, glass lid 12b, and back lid 12c. Annular frame 12a is formed in the shape of a circular ring with a metal, glass lid 12b is formed in disc-like with an electrical insulation material (glass plate), and back lid 12c is formed in disc-like with electrical insulation materials (plastics etc.). Moreover, a display 14 consists of clock short hand 14b which drives by dial-face 14a and the actuator 13, and rotates a dial-face 14a top, clock long hand 14c, and a second pointer (not shown), an actuator 13 rotates a dial-face 14a top for these clock short hand 14b, clock long hand 14c, and a second pointer, and it is constituted so that time of day may be displayed.

[0014] An antenna 16 is equipped with magnetic base material 16a prepared in accordance with the back lid 12c inner surface between annular frame 12a and an actuator 13, the magnetic core members 16b and 16b of the shape of a pin of the couple set up by this magnetic base material, and coil 16c spirally wound around these magnetic core members 16b and 16b as shown in drawing 1 and drawing 2 . Magnetic base material 16a in the gestalt of this operation is formed in the shape of [which can be inserted between annular frame 12a and an actuator 13] a ring, and the magnetic core members 16b and 16b are set up by the position of symmetry of that magnetic base material 16a, respectively. [whether magnetic base material 16a and the magnetic core members 16b and 16b are formed with a metal, the powder of a ferrite, or the composite of a flake and plastics, and] Or Fe system Alike in accordance with the inner surface of amorphous foil or annular frame 12a which has the flexibility which can be attached to the inner surface of annular frame 12a, such as Co system (METGLAS2714A by the ARAIDO chemical company), (METGLAS2605S-2 by the ARAIDO chemical company) the amorphous foil possible [an attachment] It can form with the plywood which carried out the laminating.

[0015] The ferrite or metal in the above-mentioned composite is a soft magnetism ferrite or a soft magnetism metal, can use thermoplastic plastics with the sufficient workability as plastics, or can use thermosetting heat-resistant good plastics. Moreover, as powder of the above-mentioned metal, atomization powder, such as a carbonyl-iron-powder and iron-permalloy, reduced iron powder, etc. are used. On the other hand, after making the above-mentioned powder detailed with a ball mill etc. and

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fabricating powder as a metaled flake, the flake which flattened this powder mechanically and was obtained, and the flake which the molten metal grain of an iron system or a cobalt system amorphous alloy was made to collide with water-cooled copper, and was obtained are used.

[0016] As for magnetic base material 16a formed with composite, it is desirable to form in the flexible member which can be attached in accordance with the inner surface of annular frame 12a. For this reason, as for the powder or flake of a ferrite or a metal, it is desirable to use the composite contained in the range below 70 volume % more than 10 volume %. It becomes impossible for the permeability of magnetic base material 16a obtained as the powder or flake of a ferrite or a metal is less than ten volume to become low, and to make large-sized the magnetic base material 16a itself, for obtaining required permeability, and to attain the miniaturization of antenna 16 the very thing. There is a possibility that magnetic base material 16a obtained on the other hand when the powder or flake of a ferrite or a metal exceeded 70 volume % may stop having flexibility, and there is a possibility that it may become difficult to make the magnetic base material 16a transform in accordance with the inner surface of annular frame 12a. In addition, the powder of a ferrite or a metal or especially the desirable range of a flake is 25 volume % - 56 volume %.

[0017] When forming magnetic base material 16a and the magnetic core members 16b and 16b with composite, it is desirable to injection mold or press composite. Since magnetic core base material 16a and the magnetic core members 16b and 16b which were formed with composite have flexibility, even if it makes them thin as compared with what was formed of the brittle ferrite, they cannot break easily. Moreover, the powder or flake of a ferrite or a metal is distributed by plastics, namely, since magnetic powder or a flake is mutually insulated by plastics, magnetic base material 16a and the magnetic core members 16b and 16b do not generate an eddy current, even if it does not have conductivity as a whole and receives the electric wave of a RF.

[0018] An antenna 16 has a series of coil 16c around which the axis of each magnetic core member 16b and 16b was spirally wound as a core by the magnetic core members 16b and 16b of a couple mentioned above, and coil 16c in the gestalt of this operation is made by winding coat copper wire. When the coat copper wire is made to energize coat copper wire, it is wound so that the magnetic flux produced in the magnetic core members 16b and 16b of a couple may be open for free passage through magnetic base material 16a, RF-ID tag 18 is made by connecting the IC chip 17 to coil 16c which wound coat copper wire and was obtained electrically, and the IC chip 17 is carried on magnetic base material 16a. Thus, it is in the condition which the magnetic core members 16b and 16b of a couple are the perimeters of an actuator 13, the made tag 18 was held in clock housing 12 so that it might have an axis vertical to a glass lid in the location which faces across the actuator 13, and was held in clock housing, and magnetic base material 16a is prepared in accordance with the back lid 12c inner surface between annular frame 12a and an actuator 13. In addition, the signs 12d and 12d of drawing 3 are the receptacle implements of the couple which protruded on annular frame 12a, and the ends of a band 19 are pivoted by these receptacle implements 12d and 12d, respectively.

[0019] As shown in drawing 4 , the IC chip 17 has power circuit 17a, (radio frequency RF) circuit 17b, modulation circuit 17c, 17d of demodulator circuits and CPU17e, and memory 17f that is connected to this CPU17e and memorizes the information about the owner of a wrist watch. Power circuit 17a builds in a capacitor (not shown), and this capacitor forms a resonance circuit with an antenna 16. When an antenna 16 receives the electric wave (frequency in which the above-mentioned resonance circuit resonates) of a specific frequency to this capacitor, the power produced in that mutual induction effect is charged. Power circuit 17a rectifies and stabilizes this power, supplies it to CPU17e, and activates the IC chip 17. Memory 17f, while performing read-out of the data memorized according to the read-out command by the data communication of the electric wave from a discernment means 26 to mention later under control of CPU17e including ROM (read only memory), RAM (ramdom-access memory), and EEPROM (electrically erasable pogramable read only memory), the writing of data is performed according to the write-in command from the discernment means 26.

[0020] A discernment means 26 to, read the information memorized by the IC chip 17 on the other hand is equipped with the processing section 28 which is made to send an electric wave from the transceiver

antenna 27 which carries out a mutual induction effect to an antenna 16, and the transceiver antenna 27, and processes the carrier beam electric wave of the transceiver antenna 27, and the display 29 which displays the information memorized by the IC chip 17. A receiving antenna 27 transmits an electric wave to the antenna 16 of RF-ID tag 18 built in the wrist watch 11, and ability ready for receiving constitutes the electric wave from the antenna 16. Moreover, the processing section 28 has memory 28f which memorizes the information which connected with the transceiver antenna 27, connected with power circuit 28a which builds in a dc-battery, (radio frequency RF) circuit 28b, modulation circuit 28c, 28d of demodulator circuits and CPU28e, and this CPU28e, and was read in the IC chip 17. Moreover, 28g of input sections is connected to CPU28e of the processing section 28, and the information inputted by 28g of this input section is constituted by the IC chip 17 possible [writing].

[0021] Thus, the operation of the wrist watch having the tag for discernment is explained. Before wearing a wrist watch 11 first, the information on the proper of those who wear a wrist watch 11 from 28g of input sections of the discernment means 26 is inputted, and the information on the proper about those who wear this wrist watch 11 to memory 17f of the IC chip 17 is made to memorize. With the gestalt of this operation, the information about the ticket of an electric car shall be inputted and the information about the entrainment opening day, the end date, and the entrainment section when the concrete content of an input permits the entrainment to an electric car is memorized by memory 17f. After inputting information, a possessor's arm is equipped with the wrist watch 11 through belts 12 and 12. In this case, with the wrist watch 11 with a built-in tag of this invention, since annular frame 12a expressed around glass lid 12b is formed with a metallic material when an arm is equipped, the endurance which can express the high-class feeling which that wrist watch 11 has essentially, and clock housing 12 has essentially is securable.

[0022] On the other hand, the discernment means 26 is formed in the gate in the door of a station, and when those who wore the wrist watch 11 pass through the gate, the wrist watch 11 is brought close to the transceiver antenna 27 in the discernment means 26 formed in the gate. The discernment means 26 transmits the question signal of the digital signal made binary towards the antenna 16 of RF-ID tag 18 from the transceiver antenna 27 by the electric wave of a specific frequency. The electric wave transmitted from the transceiver antenna 27 passes glass lid 12b, and is received by the antenna 16. Since it is wound here so that the magnetic flux produced in the magnetic core members 16b and 16b of a couple may be open for free passage through magnetic base material 16a when the coat copper wire is made to energize the coat copper wire which constitutes coil 16c, the magnetic flux in an antenna 16 draws a loop formation which invades from one magnetic core member 16b, passes magnetic base material 16a, and comes out of magnetic core member 16b of another side, as the continuous-line arrow head of drawing 2 shows.

[0023] For this reason, the directions of a current which flow near the annular frame 12a in a series of coil 16c wound around the magnetic core members 16b and 16b of a couple differ mutually, the induced current generated by coil 16c in one magnetic core member 16b is negated according to the induced current generated by coil 16c in magnetic core member 16b of another side, and the induced current does not flow to annular frame 12a substantially. Moreover, since magnetic base material 16a is prepared in accordance with a back lid 12c inner surface, even if the magnetization shaft in the magnetic base material 16a becomes back lid 12c and parallel and back lid 12c is formed with the metal, it can prevent that the sensibility of the antenna 16 resulting from an eddy current not flowing to the back lid 12c, and the induced current and an eddy current flowing falls. Furthermore, by having the magnetic core members 16b and 16b, the receiving sensibility of antenna 16 the very thing improves, and the antenna 16 receives effectively the electric wave emitted from the transceiver antenna 27.

[0024] Power will be charged by the capacitor of power circuit 17a if the antenna 16 in RF-ID tag 18 receives an electric wave. Power circuit 17a supplies power to CPU17e, activates the IC chip 17, and makes the question signal of the original digital signal reproduce through RF circuit 17b at 17d of demodulator circuits. CPU17e transmits the information about that wrist watch 11 memorized by memory 17f based on this question signal. Transmission of this information modulates the data signal made binary by modulation circuit 17c of the IC chip 17, and is performed by amplifying by RF circuit

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17b and sending out from an antenna 16. The transceiver antenna 27 of the discernment means 26 receives the transmitted data, and the processing section 28 is opened so that those who opened the door prepared in the gate and wore the wrist watch 11 can take an electric car, while it displays the information on the proper of those who wore the wrist watch from RF-ID tag 18 on a display 29.

[0025] In addition, although the gestalt of operation mentioned above explained the clock housing 12 which has back lid 12c formed in disc-like with electrical insulation materials (plastics etc.), the back lid 12c may be formed with a metal. Even if back lid 12c is formed with a metal, it can prevent that the sensibility of the antenna 16 resulting from the magnetization shaft in magnetic base material 16a becoming back lid 12c and parallel, an eddy current not flowing to the back lid 12c, and an eddy current flowing falls. Moreover, although the gestalt of operation mentioned above explained magnetic base material 16a formed in the shape of [which can be inserted between annular frame 12a and an actuator 13] a ring, as long as a clearance is between an actuator 13 and back lid 12c and it can hold in the clearance, as shown in drawing 5 , magnetic base material 16a may be plate-like. Furthermore, even if it is the case where there is such no clearance, as long as it is able for the magnetic flux which invaded from one magnetic core member 16b to pass magnetic base material 16a, and to come out of magnetic core member 16b of another side, as shown in drawing 6 , magnetic base material 16a may be formed in the shape of [which is between annular frame 12a and an actuator 13, and meets the inner surface of annular frame 12a] radii.

[Translation done.]

JP,2002-341059,A [EXAMPLE]

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EXAMPLE

[Example] Next, the example of this invention is explained in detail with the example of a comparison. The clock housing 12 which has annular frame 12a whose thickness which consists of <example 1 of comparison> stainless steel, and has the bore whose bore is 28mm is 3mm, glass lid 12b which closes the side front of this annular frame 12a, and back lid 12c which consisted of polycarbonate resin which closes the background of this annular frame 12a was prepared, and the actuator 13 of a disk type whose outer diameter is 20mm was held in this clock housing 12. The antenna which, on the other hand, winds the coat copper wire whose size is 0.08mm 5 times so that an actuator 13 may be surrounded in accordance with the inner surface of annular frame 12a, and consists only of a coil was created. This antenna was held in clock housing and the wrist watch with a built-in tag was obtained. This wrist watch was made into the example 1 of a comparison.
[0027] The same clock housing 12 as the example 1 of a <example 1> comparison was prepared, and the actuator 13 of the example 1 of a comparison and isomorphous ** size was held in this clock housing 12. On the other hand, the composite which comes to mix the powder of the soft magnetism metal of 56 volume % and the plastics of 44 volume % was injection molded, and the magnetic core members 16b and 16b of magnetic base material 16a and a couple were formed in one. Magnetic base material 16a was formed in the shape of [whose a bore is 21mm / whose an outer diameter is 27mm] a ring, and the magnetic base material 16a was made to set up the magnetic core members 16b and 16b of a couple so that it may face across an actuator 13. And the size formed coil 16c which wound around the magnetic core members 16b and 16b of a couple spirally the coat copper wire which is 0.08mm 20 times, respectively, and was wound 40 times on the both sides of the magnetic core members 16b and 16b of a couple, and created the antenna 16. It held in clock housing 12 and the wrist watch 11 with a built-in tag was obtained so that magnetic base material 16a in this antenna might meet a back lid 12c inner surface. This wrist watch was made into the example 1.
[0028] <Comparative study> The terminal for measurement of the measuring instrument (product made from HEWLETT PACKARD 4395) which measures a coil property was connected to the coil of the antenna in the example 1 of a comparison and example 1 which were mentioned above, and Q value was measured in L value list of an antenna to the frequency of 13.56MHz with the measuring instrument, respectively. Moreover, after considering as the RF-ID tag which connects IC chip to the coil of the antenna of the example 1 of a comparison, and an example 1, respectively, and operates by 13.56MHz, the tag was held in the cell case. This wrist watch with a built-in tag was brought close to the transceiver antenna of a discernment means to operate by 13.56MHz, the existence of actuation of that discernment means was checked, and when it operated, the distance between the transceiver antenna which operated first, and a wrist watch with a built-in tag was measured. These results are shown in a table 1, respectively.
[0029]
[A table 1]

JP,2002-341059,A [EXAMPLE]

	実施例1	比較例1
磁芯部材	有り	なし
L (μH)	1.205	1.115
Q	31.6	92.3
動作の有無	12mmの距離で作動	非作動

[0030] In an example 1 and the example 1 of a comparison, it is not thought that there is a difference with remarkable L value so that clearly from a table 1. Moreover, although the Q value of the example 1 of a comparison was clearly large as compared with the Q value of an example 1, even if it connected IC chip to the coil of the antenna of the example 1 of a comparison, a discernment means did not operate. On the other hand, although the Q value of an example 1 was small as compared with the Q value of the example 1 of a comparison, as for what connected IC chip to the coil of the antenna of an example 1, the discernment means operated. Since the electric wave was offset by the induced current to which an antenna flows an electric wave to frame part material in the carrier beam case, not operating in the example 1 of a comparison is thought of. It is thought that having operated in the example 1 is based on the result by which offset of the electric wave resulting from the induced current flowing was controlled on the other hand since a series of coil 16c was wound around the magnetic core members 16b and 16b of the couple set up by magnetic base material 16a.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The A-A line sectional view of drawing 3 showing the wrist watch with a built-in tag of this invention operation gestalt.
[Drawing 2] The perspective view showing the RF-ID tag.
[Drawing 3] The top view of the wrist watch.
[Drawing 4] The block diagram showing the relation of the RF-ID tag and discernment means.
[Drawing 5] The sectional view corresponding to drawing 2 which shows another RF-ID tag of this invention.
[Drawing 6] The sectional view corresponding to drawing 2 which shows still more nearly another RF-ID tag of this invention.
[Drawing 7] The sectional view of the conventional common wrist watch.
[Description of Notations]
11 Wrist Watch with a Built-in Tag
12 Clock Housing
12a Annular frame
12b Glass lid
12c Back lid
13 Actuator
14 Display
16 Antenna
16a A magnetic base material
16b Magnetic core member
16c Coil
17 IC Chip
18 RF-ID Tag

[Translation done.]